

Claims

1. A method of analyzing protein using laser ablation in which by irradiating laser beams on protein to be analyzed and ablating the protein, the protein is atomized into constituting elements, the atomized constituting elements are ionized, and the ionized constituting elements are analyzed, wherein

the laser beams that irradiate the protein to be analyzed and ablate the protein are ultra-short pulse laser beams,

the ultra-short pulse laser beams are irradiated on a chip having the protein fixed thereon, protein is atomized into constituting element and ionized simultaneously by ablating the protein fixed on the chip by the ultra-short pulse laser beams, and

the ionized constituting elements are analyzed.

2. The method of analyzing protein using laser ablation according to Claim 1, wherein

said chip having the protein fixed thereon is a chip having particular protein fixed thereon in which the particular protein reacted with and bonded a substance having specific bond to the particular protein fixed on the chip.

3. The method of analyzing protein using laser ablation according to Claim 2, wherein

the substance having specific bond to said particular protein is a molecule having specific bonding characteristic with protein.

4. The method of analyzing protein using laser ablation according to Claim 3, wherein

the molecule having specific bonding characteristic with said protein is nucleic acid having specific bond with protein.

5. The method of analyzing protein using laser ablation according to Claim 2, wherein

the substance having specific bond to said particular protein is protein that exerts a specific bonding action among protein.

6. The method of analyzing protein using laser ablation according to Claim 5, wherein

the protein that exerts the specific bonding action among said protein is an antibody.

7. The method of analyzing protein using laser ablation according to Claim 6, wherein

the chip having said protein fixed thereon is formed by pouring solution containing protein that reacts with said antibody on a chip having said antibody fixed thereon, allowing protein that reacts with said antibody to react with said antibody, and allowing the protein that reacts with said antibody to bond said antibody.

8. The method of analyzing protein using laser ablation according to any one of Claims 1 to 7, wherein

an element label is attached to the protein fixed on said chip.

9. The method of analyzing protein using laser ablation according to Claim 8, wherein

said element label is a stable isotopic element label.

10. The method of analyzing protein using laser ablation according to any one of Claims 8 to 9, wherein

said element label is labeled by using a puromycin derivative.

11. The method of analyzing protein using laser ablation according to any one of Claims 8 to 9, wherein

said element label is labeled by a sandwich method.

12. The method of analyzing protein using laser ablation according to any one of Claims 8 to 9, wherein

said element label is directly labeled to protein in a sample.

13. The method of analyzing protein using laser ablation according to any one of Claims 8 to 12, wherein

said chip is a multi-channelled chip.

14. The method of analyzing protein using laser ablation according to any one of Claims 1 to 10 and 13, wherein

a sample containing protein to be analyzed and labeled

protein solution, in which a label is attached to the protein to be analyzed, are mixed and poured on said chip, competitive assay is performed in which a substance having specific bond to particular protein fixed on said chip, said protein to be analyzed, and said labeled protein are bonded competitively, and the particular protein is fixed on said chip.

15. The method of analyzing protein using laser ablation according to any one of Claims 1 to 14, wherein

ultra-short pulse laser beams that are irradiated on the protein to be analyzed and ablate the protein has a pulse time width of 10 pico seconds or less and a peak value output of 10 mega watts or more.

16. The method of analyzing protein using laser ablation according to Claim 15, wherein

ultra-short pulse laser beams that are irradiated on the protein to be analyzed and ablate the protein has a pulse time width of 1 femto second or more and a peak value output of 1 giga watt or more and 10 giga watts or less.

17. The method of analyzing protein using laser ablation according to any one of Claims 1 to 16, wherein

by moving at least one of the ultra-short pulse laser beams that ablate protein and protein to be analyzed, the ultra-short pulse laser beams that ablate protein ablate the protein to be analyzed without omission and duplication to perform analysis.

18. The method of analyzing protein using laser ablation according to any one of Claims 1 to 17, wherein

the analysis of said ionized constituting elements is mass spectrometry by a time-of-flight method.

19. The method of analyzing protein using laser ablation according to any one of Claims 1 to 6, wherein

substances to be fixed on said chip are fixed as a mixture, solution attached with a different label for a substance that needs to be measured is allowed to react with the mixture, and plural types of substances are detected from the mixture.

20. The method of analyzing protein using laser ablation according to any one of Claims 1 to 6, wherein

a sample is fixed on said chip, antibody to a measuring subject, which has been labeled in plural types, is poured to measure a plurality of substances.